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STATISTICAL OFFICE OF THE
EUROPEAN COMMUNITIES (EUROSTAT)**

**ORGANISATION FOR ECONOMIC
COOPERATION AND DEVELOPMENT (OECD)
STATISTICS DIRECTORATE**

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(Geneva, 17-19 February 2003)

Topic III: Efficient management of increasing technical complexity

THE STATISTICAL TOWN PLAN

Invited paper

Submitted by Statistics Canada¹

I. INTRODUCTION

1. The Statistical Town Plan (STP) presents a conceptual view of an automation infrastructure for information management in a Statistical Office. It is a generic structural model that presents ideas for streamlining the *build-time* and *run-time* phases of information systems projects in Statistics Canada. It provides guidance to Business Planners, Information System Architects and System Designers and has the potential to be adapted for use in other Statistical Offices. The scope of the STP is limited to projects whose implementation involves the development, maintenance and operation of statistical information systems.

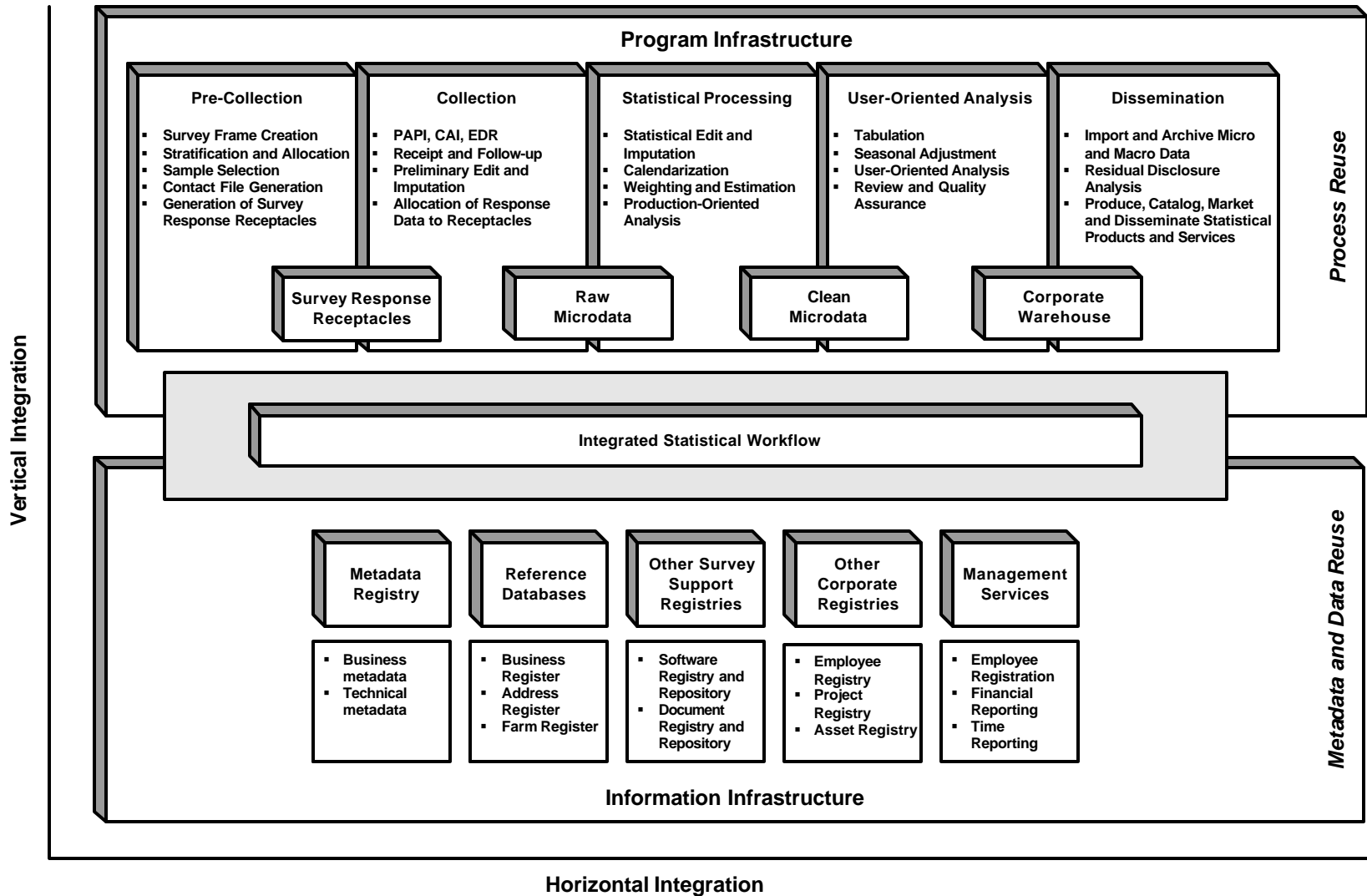
2. Section II is descriptive and presents the Program and Information Infrastructures as they currently exist in Statistics Canada.

- The Program Infrastructure promotes process reuse and includes general-purpose software and tools that are available for reuse in the development and maintenance of specific survey information systems.
- The Information Infrastructure supports data and metadata reuse. It consists of corporate databases (e.g., Business Register, Integrated Meta Database) and services (e.g., a coding service) that have been designed for cross-survey use.

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3. Section III is both descriptive and interpretive. It discusses the STP using two formal models:
 - An adapted version of a Function Hierarchy Diagram is presented first and it shows the major stages that are associated with each statistical information system project together with the corporate data stores that are most likely to be accessed in each phase.
 - A Conceptual Model of Statistics Canada is then presented in the form of an Entity-Relationship Diagram (ERD). The Overview Model presents only high level entities and relationships and discusses their role in the context of the Town Plan.
4. The paper provides a vision for streamlining the development of information systems within a statistical organisation throughout all phases of the survey life cycle by encouraging, to the extent possible, reuse of existing materials (software, data, business and technical metadata, and documentation). Ultimately, this reuse also results in increased standardization and simplification. Other potential uses of the Statistical Town Plan include:
 - It can be used to assess how well the Statistical Office has covered the risks and opportunities identified in each of its major automated components.
 - Most recently the STP has been used to provide feedback to the Office of National Statistics (ONS) in the U.K. on the degree of alignment between Statistics Canada's Information Technology Framework (ITF), the Statistical Town Plan and ONS Architectural principles.
 - Finally, Senior Management can examine the vision, decide which goals (i.e., the ends) are most important and develop an action plan (i.e., the means) for achieving strategic goals using information technology.

Figure 1: The Program and Information Infrastructures



II. THE PROGRAM AND INFORMATION INFRASTRUCTURES

A. Description

5. Figure 1 presents the Program and Information Infrastructures of Statistics Canada (integrated statistical workflow is not implemented). The Program Infrastructure shows the phases (e.g., Pre-Collection, Collection, etc.) and generic processes (e.g., Survey Frame Creation, Stratification and Allocation, Weighting and Estimation) used by a typical survey (or census). Other comments on the Program Infrastructure are:

- Each generic process will have a number of standard algorithms available for reuse. In many cases it will be possible to use an existing algorithm. In other cases it will be possible to adapt an algorithm to meet a specific survey's needs. Only in a limited number of cases should it be necessary to develop a new algorithm.

In a distributed computing environment each generic process must have a *services interface*. The services interface identifies parameters required by the process, the service to be invoked and a reference to the dataset to be processed. A second, but less desirable, reuse method would have the programmer copy the source code for a generic process into an existing program. Although this methodology is useful if the original algorithm needs to be *adapted* and an emergency solution is needed, the source algorithm must be modified once the changes have been successfully implemented.

- Four databases (Survey Response Receptacles, Raw Microdata, Clean Microdata, and Corporate Warehouse) can be used to pass statistical data between one phase and another. Statistics Canada uses CANSIM II as a Corporate Warehouse that supports both the cross-sectional and time series analysis of survey macrodata. Each survey can update this database using standardized transactions. However, no common strategy for storing survey microdata has emerged.

6. The Information Infrastructure provides a *partial list* of Statistics Canada's reusable metadata and data assets (not all are currently implemented). This reuse is achieved in a number of ways:

- Content experts can review business metadata during the formulation and development stages of projects. One major objective would be to ensure that concepts are harmonized across surveys. Another would be to ensure that the value sets of variables are standardized.
- Technical metadata can be used by IT architects during the development and maintenance phases of projects. For example, it should be possible to reuse a conceptual schema from one application to another if the applications are in the same subject matter domain.
- Reference databases are used to service families of applications in the same subject matter domain. For example, in Statistics Canada the Business Register (BR) is used as the source file for creating survey frames for Business Surveys. This means that each Business survey will be able to take advantage of the register maintenance, profiling, and processing of survey feedback activities undertaken by the Business Register Division.
- The Software Registry and Repository is used to administer reusable software components and store the source code for them. Business metadata that describes the algorithm(s) (i.e., methods) supported by each reusable software component are available for browsing. The services interface for each component is also described.
- The Document Registry and Repository provides a corporate warehouse for important documents produced by the Agency. Reference documents (e.g., corporate policy statements, corporate business plans, survey specific documentation for similar surveys) can be reviewed by content experts, methodologists and IT architects during the formulation phase of a survey. Similarly, important survey documentation (e.g., systems documentation, methodology descriptions, and operational procedures) developed during the build-time phase can be registered and stored in the Repository for subsequent review and updating.

7. Finally, the Integrated Statistical Workflow Database records the operational procedures (both automated survey processes and steps requiring human intervention are included) to be performed by a

specific statistical information system. In some cases a process in one statistical information system cannot be run until a process in another statistical information system is complete. For example, the source register for a survey needs to have its set of update procedures complete before the Survey Frame is created for a specific survey (or set of surveys). In other cases, a human must approve the output of a specific processing step before any subsequent processing steps can be run.

III. THE STATISTICAL TOWN PLAN

8. The first premise of this paper is that enterprise-level architectural models are essential to managing technical complexity. Subsection D will defend this premise by interpreting Figures 2 and 3 and illustrating some of the lessons learned from drafting, refining and validating these diagrams.

9. Figure 2 is a Function Hierarchy Diagram whose primary purpose is to list the different functions carried out by internal knowledge workers in a Statistical Office. Figure 3 is an Entity-Relationship Diagram whose primary role is to identify entities (objects) that are important to projects that involve the development and operation of statistical information systems. Important associations between these entities are also described. These two modelling types are used by projects that employ the Structured Systems Analysis and Design Methodology.

A. The Survey Life Cycle Function Hierarchy Diagram

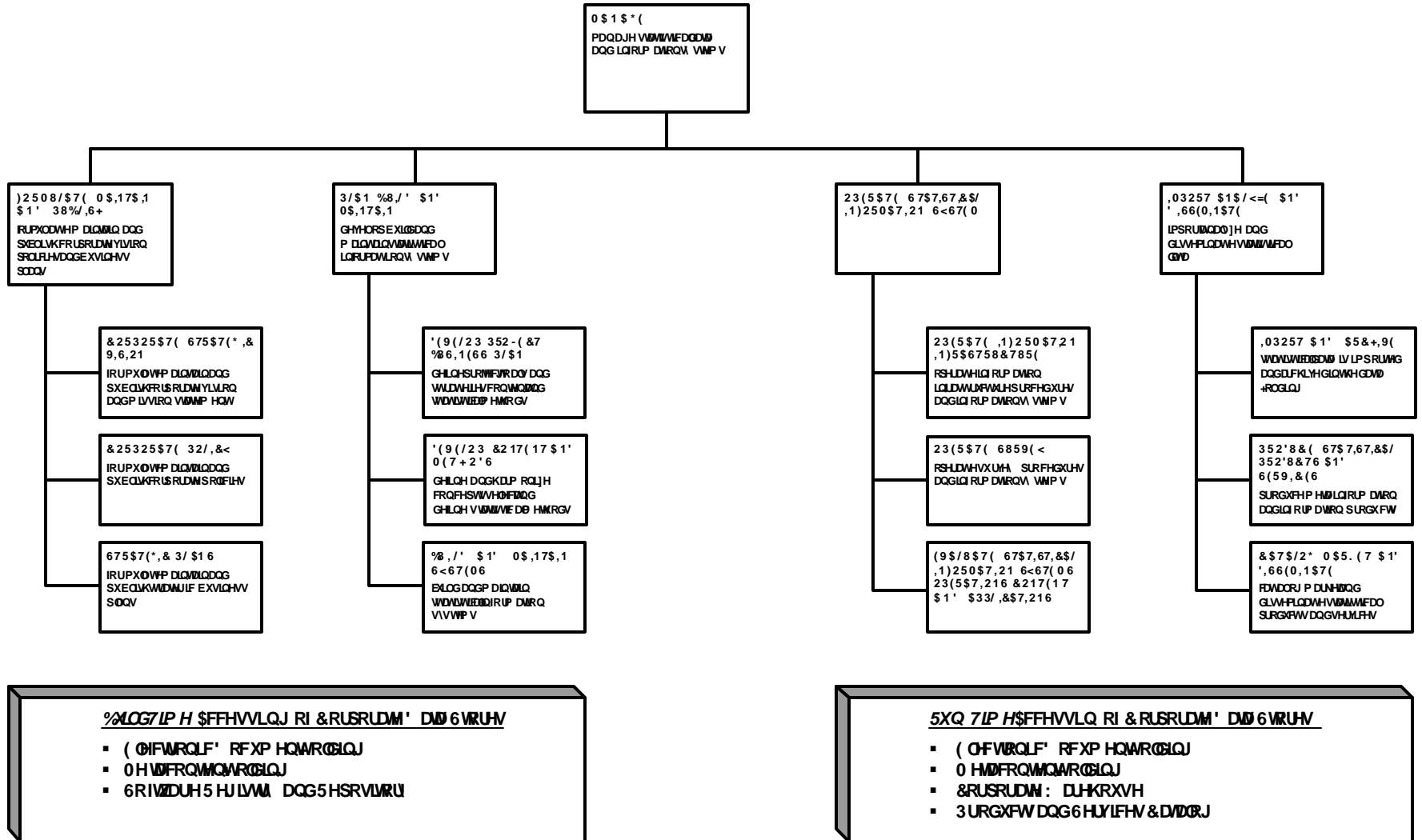
10. Figure 2 is a *highly summarized view* of the major functions associated with the Survey Life Cycle. Corporate data stores that are normally accessed during the *build-time* and *run-time* phases of a project are listed at the bottom of the diagram. Other comments on the diagram are:

- The two left-most columns show functions (activities) that are conducted during the project initiation, project approval and system building stages (i.e., build-time phase) of projects.

The FORMULATE, MAINTAIN AND PUBLISH column is independent of individual projects. It covers the formulation and publishing of i) the Corporate Strategic Vision statement, ii) Corporate Policy documents, and iii) Corporate Strategic Business Plans. These types of documents must be reviewed during the formulation phase of a project as they impact project requirements. In some cases an individual project may have business needs that require changes to an existing Corporate Policy or strategy.

The PLAN, BUILD AND MAINTAIN column first covers the activity associated with developing a Business Plan for the project. This Business Plan would include defining the target characteristics of the survey, identifying the major stakeholders, defining survey outputs that satisfy survey objectives and meet stakeholder needs, defining the major inputs to the survey, defining the statistical methods to be used to transform inputs into outputs, estimating the funding needs of the project and developing a project schedule. The Business Plan must receive Corporate approval before proceeding to the DEVELOP CONTENT AND METHODS activity. In-depth work on topics such as defining and harmonizing concepts, designing a questionnaire, and selecting and defining statistical methods must be largely complete before work on building the statistical information system begins. Preliminary decisions laid out in the Business Plan may have to be modified during the build-time and/or run-time phases of a project.

Figure 2: The Survey Life Cycle Function Hierarchy Diagram



Access to various Corporate Data Stores is needed during the build-time phase. For example, the Electronic Document Holding allows knowledge workers to review both Corporate level documents and detailed documentation about surveys that have similar characteristics to the one under consideration. The Metacontent Holding is consulted as a means of ensuring that major subject matter concepts are harmonized across surveys. The Software Registry and Repository is consulted to determine if software already exists for some or all of the statistical processes to be used by the survey. Each of these data stores offers *reuse* opportunities for a project and, as a result, an opportunity to achieve cost and time savings.

- The right-most two columns list functions associated with the production running (i.e., run-time stages) stages of projects.

OPERATE STATISTICAL INFORMATION SYSTEM includes the production running of both Information Infrastructure and Program (Survey) statistical information systems. For a typical Business Survey at Statistics Canada it would be necessary to have the Business Register coverage and maintenance operations completed before creating the Survey Frame for a specific business survey and occasion. Similarly, many of the *survey feedback* updates identified on previous survey occasions must be implemented. Thus the workflows associated with these two types of statistical information system are intertwined. Figure 1 provides a detailed list of the generic processes associated with a typical survey application.

EVALUATE STATISTICAL INFORMATION SYSTEMS OPERATIONS, CONTENT AND APPLICATIONS is the final step of the Survey Cycle for a specific survey occasion. It includes the production of required tabulations, the running of seasonal adjustment procedures and the production of analytical reports. Evaluation would include topics such as quality monitoring and control of operations related to coding, data capture and edit, questionnaire effectiveness, sampling strategy, response rates, and assessing and reporting on the statistical quality of the survey program. Sundgren (1999) deals with evaluation in a more substantial way.

IMPORT , ANALYZE AND DISSEMINATE makes the statistical data (*anonymized* micro data files, macro data, metadata) produced by a survey available to the public. The Clean Micro Data File produced by a survey is exported to a Corporate Warehouse where it may be used to produce customised tabulations for our external stakeholders. Clearing-house staff would ensure that the value sets of variables on the Clean MicroData File meet Corporate standards as defined in the Corporate Metacontent Holding. Macrodata would be stored in a multi-dimensional database (CANSIM 2 is Statistics Canada's multi-dimensional database) that accomodates both cross-sectional and time series analysis.

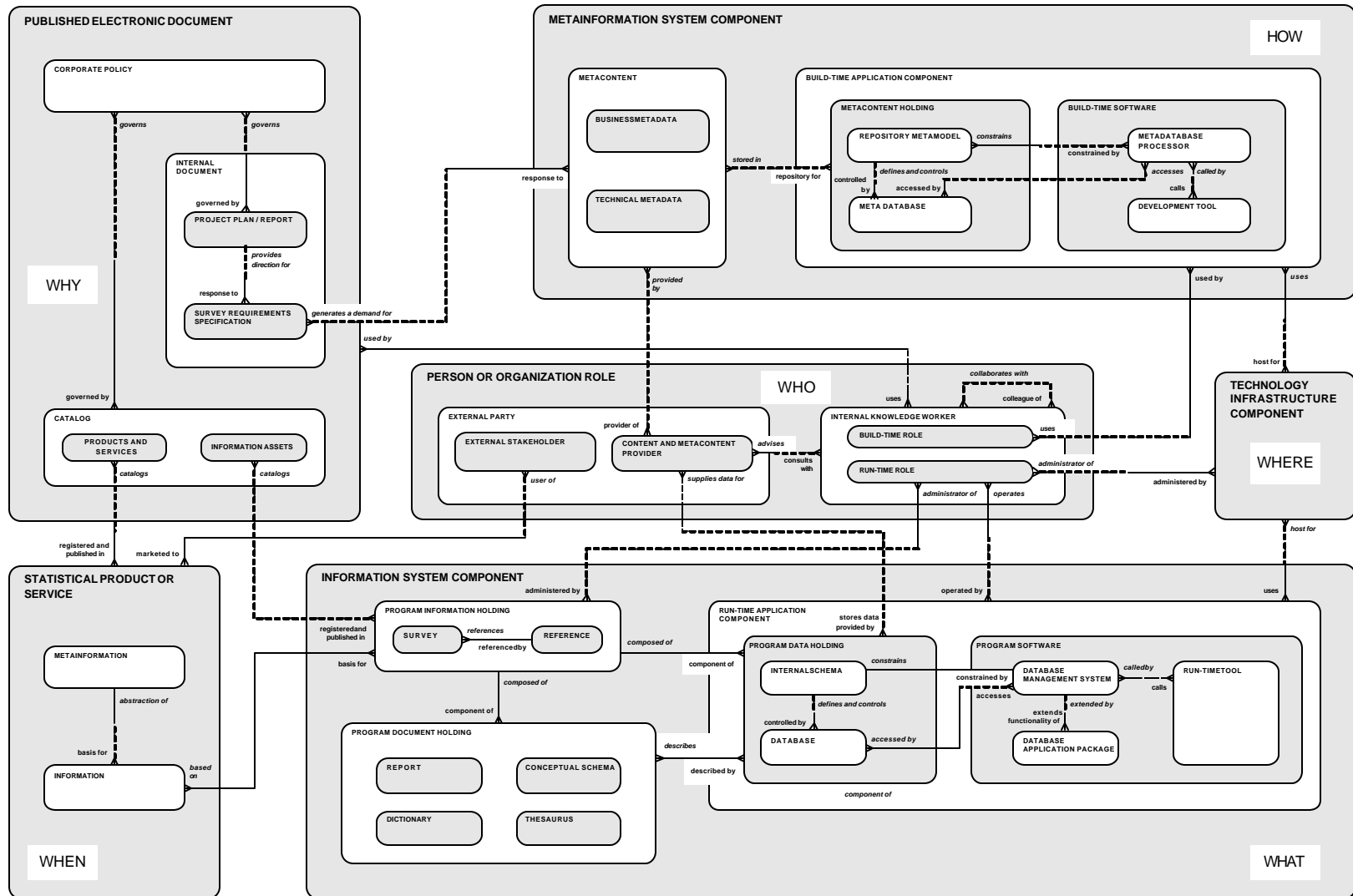
Access to Corporate Data Stores is also needed during the run-time phase. For example, the Corporate Warehouse is updated for each survey occasion when survey-specific microdata and macrodata is exported to the Corporate Clearing-house. The Electronic Document and Metacontent Holdings are updated in response to changing survey requirements.

B. The Overview Model

11. Figure 3 is a high level conceptual view of the Statistical Town Plan Entity-Relationship Diagram (ERD). Six primary entities (supertypes) "*house*" a number of lower level entities (subtypes). A brief description of the notation used in this ERD follows:

- Significant associations (relationships) between two entities are represented by solid (i.e., a mandatory association), dashed (i.e., an optional association) or a combination of solid and dashed lines (i.e., the association is optional in one direction and mandatory in the other).

Figure 3: The Overview Model



- All associations are described using phrases that have a subject, verb and object. For example: a Corporate Policy Document may govern one or more Project Plans / Reports; a Project Plan / Report must be governed by one or more Corporate Policy documents. Graphically, a solid line segment at the Entity that is the subject of a sentence represents a mandatory association. A dashed line segment represents an optional association.
 - Crows feet are used as line endings for plural (i.e., one or more) associations. A simple line ending indicates a singular (i.e., one and only one) association. For example, a Repository Metamodel may define and control one or more Meta Databases. A Meta Database must be controlled by one and only one Repository Metamodel.
12. Two other notes about the Overview Model diagram are important. First, while the ERD shows a number of associations, this paper must, *for space reasons*, i) omit explaining why certain associations are optional and others are mandatory and ii) omit less important associations. For a similar reason only the Overview Model is presented. A more detailed set of STP Models is currently available, but their accompanying descriptions will not be available until the spring of 2003.

13. Second, the Overview Model presents, *from the authors' viewpoint*, an automation infrastructure for information management that would be appropriate for use in Statistics Canada. Entities and relationships appearing in the Overview Model are those that were deemed to be the most important. In some cases these entities do not yet exist. Follow-up discussions with other personnel within Statistics Canada and in other Statistical Offices would certainly cause changes to the Model. By selecting a formal modelling methodology it will be possible to maintain the Model through several rounds of *validation*.

14. The primary entities in Figure 3 represent the major components of a Statistical Office's operation. The scope of this version of the Statistical Town Plan is limited to projects whose implementation involves the development, maintenance and operation of statistical information systems. The major components can be described as follows:

- The Person or Organisation Role component is central to the model and is decomposed into the subtypes External Party and Internal Knowledge Worker. An External Party may be an External Stakeholder and/or a Content and Metacontent Provider. External Stakeholders are users of our Statistical Products and Services while Content and Metacontent Providers are providers of Business Metadata, Technical Metadata and the observation data stored in a Program Data Holding.

Internal Knowledge Workers have a *Build-Time* and/or *Run-Time Role*. In the *Build-Time Role* they use a *Development Tool* [e.g., Computer Assisted Software Engineering (CASE) tools are commonly used to develop and maintain technical metadata, forms may be used to collect business metadata, part of the code for an application may be generated] to create and reuse both business and technical metadata. In the *Run-Time Role* they are operators of a *Run-Time Component*, administrators of the *Technology Infrastructure* or administrators of a *Program Information Holding*. An employee may act in more than one role.

- The Published Electronic Document component represents a Corporate Electronic Document Holding. Access to documents is provided to Internal Knowledge Workers of the Statistical Office. Public documents can be viewed by retrieving them from the Electronic Document Holding. More commonly they are viewed using the Statistical Office's Internet site. Internal Documents are accessible on the Corporate Intranet site.
- The Metainformation System Component has both a Metacontent and Build-Time Application Component. Metacontent includes both Business Metadata and Technical Metadata. Business Metadata is viewed by External Parties and Internal Knowledge Workers while Technical Metadata is reviewed, reused/adapted and developed by IT Architects in the formulation, development and maintenance phases of statistical information system projects.

Both types of metadata can *logically* be stored in a Corporate *Meta Database*. However, it is more likely that these two types of metadata will be stored in physically separate databases and be populated using different types of tools.

- The Information System Component has a Program Information Holding, a Program Document Holding and a Run-Time Application Component. The Program Information Holding is composed of Program Document and Program Data Holding components. Program Information Holdings are registered and published in the Information Assets Catalog. A Program Information Holding is either a Survey Information Holding or a Reference Information Holding. A Reference Information Holding is referenced (reused) by one or more Survey Information Holdings.

A Program Document Holding contains the different types of documents that describe a Program Data Holding. The model shows standardized documents for analysis and research (Report); concepts and terminology (Dictionary and Thesaurus); and a Conceptual Schema. Note that the Dictionary and Thesaurus are application specific subsets extracted from the Corporate Metacontent Holding.

The observation data collected by a survey is stored in a Program Data Holding after it has been processed by the Program Software for a specific Run-Time Application Component. In any proposed Survey Data Holding there are two kinds of data holdings: a microdata holding and a macrodata holding. In addition, variables from Reference Data Holdings may either be replicated or referenced. In Statistics Canada macrodata are stored in CANSIM 2, our Corporate Data Warehouse.

- The Statistical Product or Service component consists of both Metainformation and Information products and services. Statistical Products and Services are marketed to External Stakeholders. Further, these Statistical Products and Services may be published in the Products and Services Catalog for the Statistical Office. The Program Information Holding is the basis for producing Information Statistical Products or Services. The Metacontent Holding is used to produce Metainformation Statistical Products or Services.
- The Technology Infrastructure Component represents the IT infrastructure of the Statistical Office. Both Build-Time and Run-Time Components may use one or more of the Technology Infrastructure Components (these are included in a lower level ERD): Infrastructure Software, Security, Hardware and Communications.

15. Each of the 6 primary entity types that comprise the Overview Model ERD can be treated as a major architectural topic in describing a Statistical Office. These topics have a primary focus that can be aligned with the 6 columns (WHAT, HOW, WHERE, WHO, WHEN, WHY) of row 2 of the Zachman Framework.

Justification for this alignment is given below.

- **WHY:** Organizational motivation is provided by Business Planning documents that outline the Vision, Mission, Goals and Policies. Automation technologies supporting the Electronic Document Holding are XML-based.
- **WHEN:** The “master schedules” for Statistical Office operation derive from dissemination deadlines. Workflow technologies assist in streamlining both the carrying out of operational procedures and the running of statistical information systems. There will be an overall improvement in timeliness.
- **WHO:** Roles and responsibilities of internal knowledge workers are defined and aligned with dependencies on technology. Knowledge workers will be engaged in the continuous learning of new technologies.
- **WHAT:** From a technology perspective these are the components of an automated statistical information system. The Information System Component has been decomposed into Program Information Holding and Run-Time Application components. This allows us to more easily associate the roles and responsibilities of knowledge workers with the operation of statistical information systems.
- **HOW:** The architectural artifacts that define automation of statistical production are the record of statistical office automation “know how”. They are created in the context of a metainformation system. Reuse of these design artifacts will contribute to the management of complexity by constraining any counter-productive diversity.

- WHERE: Technology components are physically located and managed by the Technology Infrastructure component. This component enables location-transparency and, as a result, distributed computing.

C. Some Frameworks and Models that Work Together

The **Zachman Framework** classifies the architectural artifacts of a specific enterprise. For example, the enterprise may be the Government of Canada, Statistics Canada, or an organisational unit within Statistics Canada. The Zachman Framework has been and continues to be used at each of these levels of progressive elaboration. Figure 4 shows the upper two rows of the Zachman Framework. These are the ones of most interest to the Senior Management of an enterprise.

The Statistics Canada **Information Technology Framework (ITF)** is a strategic framework that aligns information technology with the business objectives of the Agency. It is a frame of reference organised as a coherent assembly of "perspectives" (Corporate, Program, Information, Community, Platform and Government) that view Statistics Canada as the "Enterprise". As such, it must be aligned with the business strategies of the department and the government as a whole.

The **Statistical Town Plan (STP)** is another reference that can be used effectively in the practice of Business Architecture at Statistics Canada. It is a formal model as opposed to a framework. It shows the structural relationships amongst the entities that comprise a Statistical Office.

Figure 4: Zachman Framework, ITF and STP Alignment

	WHAT Data	HOW Function	WHERE Network	WHO People	WHEN Time	WHY Motivation	
Scope (Planner)	Information Perspective	Program Perspective	Platform Perspective	Community Perspective	Government Perspective	Corporate Perspective	ITF Perspectives
Enterprise Model (Owner)	Information System Component	Meta-information System Component	Technology Infrastructure Component	Person or Organization Role	Statistical Product or Service	Published Electronic Document	STP Overview Model Components

16. The value of the Zachman Framework to a particular enterprise is its role in organizing architectural artifacts for effective use and reuse by corporate audiences. An investment is made to develop the original artifacts, usually within the domain of a specific project. Corporate savings occur when these artifacts are subsequently reused by other projects. Each row of artifacts presents a total view of an enterprise or enterprise component from the perspective of a specific audience. Audiences shown in Figure 4 are planners and owners. Hutton and Graves (2002) discuss these topics in more depth in Statistics Canada's Business Architecture Series of papers.

17. Figure 4 provides a positioning of ITF "perspectives" and STP Overview Model "components" as artifacts within the Zachman Framework. Allocation to a specific class (cell) is based on the dominant characteristic(s) of the perspective or component. This nominal alignment is provided to facilitate tapping into the large body of Enterprise Application Integration experience and literature based on the Zachman framework and to facilitate comparison of architectures between organisations. It also ensures, **via the ITF**, that design, construction and maintenance of the IT components of the statistical system remain aligned with the business needs of Statistics Canada.

18. The ITF and STP are *dynamic* in the sense that updates to them will be required in response to changing business needs (e.g., enhanced security requirements to support Electronic Data Reporting) and the

emergence of new technologies. The Function Hierarchy Diagram and Overview Model ERD are formal models (Data Flow Diagrams and Work Flow Models are other examples) that can be created and maintained using a Computer Assisted System Engineering (CASE) tool. This ability to respond to changing needs is important if the models are to reflect current business needs and priorities.

D. How do the ITF, the STP and the Zachman Framework help Manage Complexity?

"It is a general law in the history of science and ideas that simplicity follows complexity and does not precede it. Theories and models are perceived as exceedingly complex at the time they are created and before they gain wide acceptance. After they're accepted, theories are simplified and reduced to their applicable cores. Only parts of them are used, and the underlying concepts become part of the shared, universal culture. Examples of this phenomenon include Newton's theory of gravity and Maxwell's theory of electrodynamics." [Biezunski (2002)]

19. The Statistical Town Plan was originally developed as a model to support architectural analysis within the Geographic Integration and Connectivity (GIC) project (Graves, Murray, Rushforth 1998) sponsored by the Geography Division of Statistics Canada. In subsequent architecture projects (Hutton, Graves, Meagher 2000 and Graves, Hutton 2001), it has been used in combination with the Zachman Framework. Most recently it has been used to provide feedback to the Office of National Statistics (ONS) in the U.K. on the degree of alignment between Statistics Canada's Information Technology Framework, the Statistical Town Plan and ONS Architectural principles. Each of these projects has increased our understanding of the Statistical Town Plan. This paper was the catalyst for developing and documenting a less complex version of the Statistical Town Plan (i.e., the Overview Model ERD).

20. Since the Overview Model shows on one page the most important components of the automation infrastructure, it, in combination with the ITF, provides a framework for debating important IT-related issues. Three examples of the types of corporate issues that might be debated and questions that might be asked are:

- Our internal knowledge workers are a Statistical Office's most important asset. Are we providing them with the corporate-level build-time (e.g., Computer Assisted Software Engineering services, on-line browse and update services to the Document and Metadata Warehouses), and run-time tools (e.g., a coding service, content management service) that make them efficient?
- Reuse of existing materials (documentation, business and technical metadata, data, and software) is a major theme of this paper. Intelligent reuse leads to higher quality systems, significant cost savings and shorter development times. Corporate data stores that support these types of reuse appear explicitly (e.g., Electronic Document Holding, Metacontent Holding) or implicitly (e.g., Business Register, Data Warehouse) in the diagram. Are these data stores being used effectively in the Agency? Are there others (e.g., Technical Metadata Registry and Repository) that need to be added to further streamline system development?
- A number of entities appearing in the Overview Model represent corporate registers. All registers (Gallagher and Carnahan 2000) have a common set of services. In addition, there is a unique set of services offered by each register. Has the Agency used a collaborative development strategy for our many registers or has each one been developed on a standalone basis? Do we have a corporate registry of our employees that combines our administrative data needs with, for example, our security needs?

21. Once the debate has been held management can decide, on the basis of corporate priorities, which initiatives are to be implemented in a specific planning round.

22. The STP can serve as a standing architectural document, to undergo periodic review in the same manner as, and in response to changes in the ITF. Documentation and alignment of the STP with the Zachman Framework and the ITF will:

- allow management to evaluate the compliance of future system development projects against the models, and
 - provide architects and system developers with guidelines for implementing future system development projects, and
 - support indexing into the body of literature relating to Enterprise Architecture, and
 - identify application infrastructure components that, if purchased or developed, will reduce the development time for new and re-engineered projects.
23. Finally, the STP documentation will be at a level where significant business knowledge and vocabulary can be passed on to a variety of employees (e.g., new recruits, experienced employees joining STC, contractors, subject matter staff). The document, if used in conjunction with other reference documents (e.g., the ITF, the Zachman Framework, an Overview of Business Survey Processing) and methodologies will provide these target groups with additional insight and a vocabulary that enables them to communicate more effectively. This, in turn, will result in higher quality systems.

IV. CONCLUSION

24. Statistics Canada's organization is already aligned with a number of the initiatives appearing in the Figures 1 through 4 inclusive. Examples include:
- We have developed generalized software for many of our generic statistical processes (e.g., sampling, edit and imputation, estimation) and use other generalized tools (e.g., Blaise, SAS) for developing specific types of systems.
 - We have located the operations of most of our reference databases within the Classification Systems Branch. For example, the Business Register is operated by Business Register Division and it is used as a source for deriving survey frames for business surveys and for implementing survey and profiling feedback. The Integrated Meta Database is run by Standards Division and it is used as a corporate repository for storing business metadata and classifications.
 - The Collection function is the joint responsibility of 3 divisions: Operations and Integration, Operation Research and Development, and Survey Operations. Dissemination Division is responsible for the operation and maintenance of our corporate warehouse, CANSIM II. CANSIM II supports the cross-sectional and time series analysis of our macrodata.
 - The Zachman Framework is in common use by IT architects within the Agency. Documents [Graves, Hutton (2002)] are part of the Business Architecture series and outline how the STP, in conjunction with the Zachman Framework, can be used as a template for developing Business Plans for new or re-engineering systems projects.
25. A first premise of this paper is that enterprise-level architectural models are essential to managing technical complexity. The models that comprise the STP have been developed keeping this premise in mind.
26. A second premise is that enterprise-level architectural models must be validated against the formal models used to design and build existing systems. This is an activity that needs to be carried out in the future. Some validation with our Business Surveys environment [Hutton (1999)] has been carried out by the authors during the development of the current version of these models. Indeed, it would be beneficial if other Statistical Offices could be aligned with the STP with the view of developing a set of models that describe all Statistical Offices.

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